

OCULOCARDIAC REFELX IN STRABISMUS SURGERY UNDER GENERAL ANESTHESIA

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ABSTRACT

Objective: To compare the incidence of oculocardiac reflex with pre-medication, atropine sulphate, and without pre-medication in strabismus (squint) surgery.

Material and Methods: This study was a randomized control trial performed in the department of anesthesia at Khyber Teaching Hospital, Peshawar from January 2012 to September 2012. Eighty patients of ages between 10 to 18 years were randomly divided into two groups. The patients in Group A were pre-medicated with an anticholinergic drug (atropine sulphate) while the patients in group B were not administered any pre-medications. Patients in both the groups were anesthetized with similar drugs during strabismus surgeries. Patients were monitored using blood pressure, electrocardiography and heart rate monitor. Dysrhythmias occurring during anesthesia were identified and documented in each group.

Results: Dysrhythmias were observed in both the groups but the incidence was very high among patients from group B. In group A 2 patients (5 percent) while in group B 25 patients (65 percent) developed dysrhythmias. In both the groups only 2 patients (3 percent) developed ventricular ectopics while 25 patients (31 percent) developed bradychardia.

Conclusion: This study shows that the incidence of oculocardiac reflex is very high in patients who were not pre-medicated with an anticholinergic drug. Hence, all the patients requiring general anesthesia for eye surgeries should have a proper anticholinergic pre-medication.

Key Words: General Anesthesia, Oculocardiac, Reflex, Anticholinergics, Strabismus.

INTRODUCTION

Oculocardiac reflex or Aschners reflex was first recognized in 1908¹. Studies establishing this reflex as a complication of ocular surgery have been documented in the west but no such study has been conducted in our province, which is necessary to confirm any variation of its incidence with respect to environmental and racial factors.

Dysrhythmia is a change in the normal physiological rhythm of the heart so the Oculocardiac reflex is defined as occurrence of dysrhythmia when pressure is applied on the eye ball or extraocular muscles. Inhalational anesthetic agents make the heart

vulnerable to increased vagal tone especially in the young. Oculocardiac reflex is mediated via trigeminal-vagal reflex arc. The afferent division of the arc is ophthalmic branch of trigeminal nerve and efferent division is vagus nerve. This reflex is predominantly seen in pediatric patients but is not uncommon in adults¹ either. This reflex is stimulated in a variety of ocular surgeries like strabismus, cataract, enucleation and retinal detachment². It has been observed that patients with gray and blue irises are less prone to this reflex than patients having brown and hazel coloured irises³. Dysrhythmias are elicited by applying pressure on the extra ocular muscles or eyeball. They may be in the form of nodal rhythm, premature ventricular beats, bradycardia, ventricular fibrillation or cardiac arrest⁴. Oculocardiac reflex can also develop in conscious patients under local anesthesia. In these patients in addition to dysrhythmias nausea, vomiting and somnolence is experienced. It is observed more commonly in anesthetized patients and in ninety percent of children not receiving prophylaxis for its prevention⁵.

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MATERIAL AND METHODS

This randomized control study was performed in the eye operation theatre by the Anesthesia Department Khyber Teaching Hospital, Peshawar, after approval from the ethical committee. Study duration was from January 2012 to September 2012. Convenient sampling was applied in this study. The sample included a total of 80 patients divided into two groups, A and B. Group A patients were administered Atropine, while the Group B patients were not administered Atropine. Inclusion Criteria was age 10-15 years, patients with ASA class I and II (American Society of Anesthesiology), all patients undergoing strabismus surgery. While exclusion Criteria included patients who were having glaucoma, tachycardia, fever and dysrhythmia. Preoperative assessment and informed consent was taken from the patients.

Heart rate, blood pressure, heart rhythm and respiratory rate were monitored throughout the surgery. Any change in these variables due to oculocardiac reflex was documented on a standard proforma. Bradycardia was defined as a heart rate of 60 or less than 60 beats per minute. Patients in group A were administered Atropine Sulphate in a dose of 0.02 mgs/kg body weight, just before the induction of anesthesia while no Atropine was given to patients belonging to group B. Patients in both groups were induced with intravenous Propofol in a dose of 2 mgs/kg body weight and a non-depolarizing muscle relaxant atracurium in a dose of 0.5 mgs/kg body weight. After endotracheal intubation anesthesia was maintained with oxygen and isoflurane. Tramadol 1mg/kg was used as an analgesic. Data analysis was done using Ibm spss version 2.0. Graphs were made using Microsoft excel 2010.

RESULTS

Oculocardiac reflex occurred in both the groups but the percentage was higher in group B (non-medicated), shown in figure 1. The types of Dysrhythmias that occurred and there frequency is shown in figure 2. In both the groups heart rate did not decrease more than 35 beats per minute. Mild decrease in Blood pressure was observed in patients of group B during the reflex. Data was considered significant with a p value of <0.05 calculated by applying chi square test.

DISCUSSION

Oculocardiac reflex describes that the pressure and traction applied on the eyeball can produce a variety of cardiac dysrhythmias which includes sinus bradycardia, ventricular ectopic beats, ventricular fibrillation and even sinus arrest by activation of vagal nerve fibers in the sinus node. The more aggressive the manipulation of extra ocular muscle the higher the

chances of oculocardiac reflex⁶. Anticholinergic medication like atropine and glycopyrolate are helpful in preventing this reflex. Intravenous Atropine or glycopyrolate when given just prior to surgery are more effective than when given intramuscular⁷. Atropine sulphate is one of the anticholinergic drugs. In clinical doses it blocks muscarinic acetylcholine receptors and hence produces its effects in accordance with the distribution of muscarinic receptors in different organs. Blockage of muscarinic receptors in the sinoatrial node leads to tachycardia. This effect is especially important in reversing the bradycardia associated with vagal reflexes like baroreceptor reflex, peritoneal stimulation or oculocardiac reflex⁸.

The use of anticholinergic medicines may be hazardous in some patients like patients with tachycardia, hyperthyroidism, angle closure glaucoma

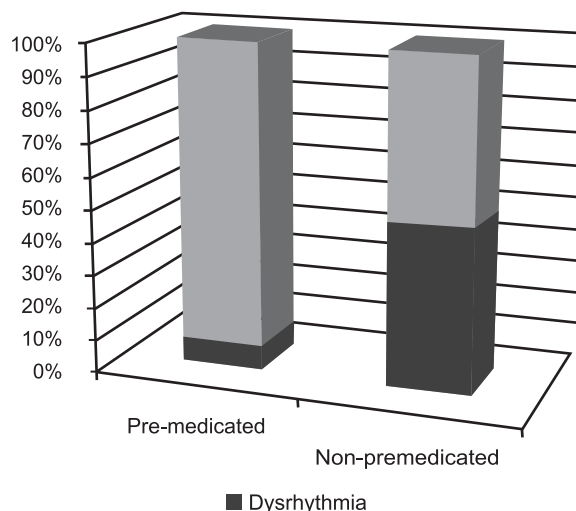


Fig 1: Comparison of Dysrhythmias frequency between premedicated and non-premedicated patients

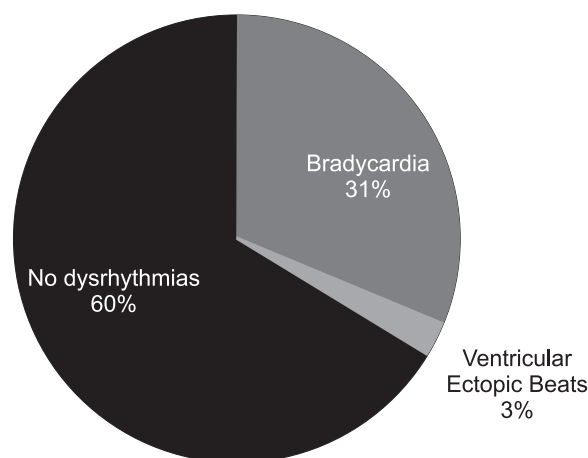


Fig 2: Quantification of the different types of dysrhythmias observed.

and elderly with coronary artery disease. Retrobulbar block with local anesthetic agents has been used in the past for the prevention of this reflex but instead was found to be a causative factor⁹.

In our study we found that incident of dysrhythmias in group A was 5%. In group B the incident was 65%. In group A only bradycardia was detected and there was no change in the blood pressure of the patients. While in group B significant dysrhythmias were noted with mild fall in blood pressure. Luckily serious dysrhythmias like ventricular fibrillation or cardiac arrest were not detected. In group B two types of dysrhythmias were noted bradycardia and ventricular ectopic beats, patients were not allowed to be in a state of dysrhythmia for a longer period of time even bradycardia was treated immediately that is why we did not observed any serious dysrhythmia.

The incidence of dysrhythmia was quite high in the past¹⁰. Now due to advanced monitoring, safe anesthetic agents and in time detection, the incidence of morbidity and mortality associated with this reflex has decreased. Moreover the routine use of an anticholinergic drug like Atropine sulphate as pre-medication in ocular surgery has also decreased the incident of oculocardiac reflex¹¹.

The occurrence of dysrhythmias is not limited to strabismus surgeries alone, study done by Yang shows that intra ocular foreign bodies can also elicit this reflex¹². Likewise diseases of the choroid can also produce the oculocardiac reflex¹³.

In terms of general anesthesia as being an important risk factor of this reflex, study done by Grover and Bhardwaj¹⁴ showed that local anesthesia produces less bradycardia and ectopic arrhythmias and accordingly they have urged the use of local anesthesia over general anesthesia in surgeries involving extra ocular muscle manipulation. Karhunen¹⁵ compared atropine and glycopyrolate effectiveness in preventing dysrhythmias and he found atropine to be more efficacious as a first line choice of pre-medication for strabismus surgery. Bosomworth¹⁶ emphasizes the need of continuous monitoring of the cardiac rate and rhythm of the patient undergoing eye muscle surgery. According to Buchwald¹⁷ and Victor¹⁸ general anesthesia is the single most important cause of all types of dysrhythmias that have been reported to occur in oculocardiac reflex. According to a study published by Sing and Roy ketamine when used as a topical anesthetic in rabbits, effectively prevented the occurrence of Oculocardiac reflex¹⁹. On the other hand study done by Baek and Park²⁰ showed that oculocardiac reflex can occur during endoscopic sinus surgery and is not limited to Ocular surgeries only. And a case reported by Mezitis showed that

Oculocardiac reflex can follow insertion of a bilateral nasal balloon catheter for controlling bleeding following head trauma.

CONCLUSION

Pre-medication are extremely important in preventing oculocardiac reflex in patients undergoing general anesthesia. Proper intra operative monitoring is mandatory in all the patients during surgery.

REFERENCES

1. Myers EF. Anesthesiology. Oculocardiac reflex in Paediatric patients. *Anesthesiology* 1979; 51; 350-55.
2. Robideaux V. oculocardiac reflex and general anaesthesia in paediatric patients. *Anesthesiology*. 1978; 49; 433-37.
3. Kwick RS. Anesthesia dysrhythmias in ocular surgery. *Anesthesia* 1980; 33; 46.
4. Kerr WJ, Vance J. dysrhythmias in ocular surgery. *Anesthesia* 1983; 38; 883.
5. McGoldrick K. E. Anesthesia for Ophthalmic Otolaryngologic surgery. *BMJ* 1992, 23, 331-39.
6. Rosenfeld S, Litinsky S, Snyder D. Effectiveness of monitored anesthesia care in cataract surgery. *Ophthalmology* 1999; 106 ; 1256-60.
7. Alexander JP. Reflex disturbances of cardiac rhythm during ophthalmic surgery. *British Journal of Ophthalmology* 1973; 59; 518-24.
8. Mirakur R. K, Jones C. J, Dundee J. W, Archer D. B. IM or IV Atropine or Glycopyrolate for the prevention of oculocardiac reflex in children undergoing squint surgery. *British Journal of Anesthesia* 1982; 54; 1059-63.
9. Blanc VF, Hardy J, Milat J, Jacob J. The oculocardiac reflex: a graphic and statistical analysis in infant and children. *Canadian Anesthetists Society Journal* 1983; 30, 360-69.
10. Mirakur RK, Shepherd W, Jones C. J. Ventilation and the oculocardiac reflex. Prevention of oculocardiac reflex during surgery for squints. Role of controlled ventilation and anticholinergic drugs. *Anesthesia* 1986; 41, 825-58.
11. Hyun Y, Eun D. A Case of Delayed Oculocardiac Reflex Induced by an Intraorbital Foreign Body. *Ophthalmic Plastic & Reconstructive Surgery*: 2011; 27(1), 2-4.
12. Steinmetz A, Ellenberger K, März I, Ludewig E, Oechtering G. Oculocardiac Reflex in a Dog Caused by a Choroidal Melanoma with Orbital Extension. *Anesthesiology* 2013 ; 41 (3), 155-62.
13. Grover V. K, Bhardwaj N, Shobana N, Grewal P. Oculocardiac reflex during retinal surgery using

- peribulbar block and nitrous narcotic anesthesia. Ophthalmic Surgery and Lasers. Department of Anaesthesia, Postgraduate Institute of Medical Education and Research, Chandigarh, India, 1998, 29(3): 207-12.
14. Karhunen U, Cozantis D. The oculocardiac reflex in adults a dose response study of glycopyrrolate and atropine. JAA of Great Britain and Ireland. 1984;39 (6). 524-28.
 15. Bosomworth H, Peter P, Ziegler I, Carolynh A, Jacob Y. The Oculo-Cardiac Reflex in Eye Muscle Surgery. Anesthesiology 1958, 19(1). 7-9.
 16. Gold R. S, Pollard Z, Buchwald P. Asystole due to the oculocardiac reflex during strabismus surgery: a report of two cases. Annals of Ophthalmology 1988, 20(12): 473-25.
 17. Faria B, Hardy F, Milot J, Jacob L. The oculocardiac reflex: a graphic and statistical analysis in infants and children. Canadian Journal of Anesthesia, 1983, 30 (4) 360-69.
 18. Sing J, Roy S, Mukherjee P, Konar D, Hazra S. Influence of topical anesthetics on oculocardiac reflex and corneal healing in rabbits. International Journal of ophthalmology. 2010; 3(1): 14-18.
 19. Baek HI, Park BC, Kim WH, Son WS. Oculocardiac reflex during the endoscopic sinus surgery. American Journal of Otolaryngology – Head and Neck Medicine and Surgery. 2010; Volume 31(2): 136-30.
 20. Stathopoulos P, Mezitis M, Kostakis G, Rallis G. Iatrogenic Oculocardiac Reflex in a Patient with Head Injury. Cranial Maxillofacial Trauma Reconstruction 2012; 05(04): 235-38.

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